ಕರ್ನಾಟಕ ರಾಜ್ಯಪತ್ರ

ಅಧಿಕೃತವಾಗಿ ಪ್ರಕಟಿಸಲಾದುದು

ವಿಶೇಷ ರಾಜ್ಯ ಪತ್ರಿಕೆ

ಭಾಗ – ೩ Part – III	ಬೆಂಗಳೂರು, ಸೋಮವಾರ, ೨೧, ಜುಲೈ, ೨೦೨೫ಜಿ(ಆಷಾಢ , ೩೦ ಶಕವರ್ಷ, ೧೯೪೭) BENGALURU, MONDAY, 21, JULY , 2025(ASHADHA , 30, SHAKAVARSHA, 1947)	ನಂ. ೪೦೬ No. 406

KARNATAKA ELECTRICITY REGULATORY COMMISSION

No. 16 C-1, Miller Tank Bed Area, Vasanth Nagar, Bengaluru- 560 052.

NOTIFICATION

KERC/KEDC/2025-26/513, dated: 17.07.2025

Karnataka Electricity Distribution Code (KEDC), 2025

CONTENTS

Karnataka Electricity Distribution Code (KEDC), 2025

Preamble:

1. In exercise of powers conferred under clause (zp) of sub-Section (2) of Section 181 read with sub-Section (1) of Section 42 of the Electricity Act, 2003 (36 of 2003) and all other powers enabling it in this behalf, the Karnataka Electricity Regulatory Commission had notified the Distribution Code, 2015 (KEDC, 2015) on 03.02.2016.

   Part VI of the Electricity Act deals with provisions with respect to Distribution Licensees. Sub-Section (1) of Section 42 of the Act provides that, it shall be the duty of a Distribution Licensee to develop and maintain an efficient, coordinated and economical Distribution system in his area of supply and to supply electricity in accordance with the provisions contained in the Act read with section 57, 59 and 61.

2. The Central Electricity Regulatory Commission has notified (Indian Electricity Grid Code) Regulations, 2023 on 29.05.2023 duly repealing IEGC Regulations 2010 and all subsequent amendments thereof.

   This has mandated upon the Distribution Licensees, various functions in the Operating Code and the Schedule and Dispatch Code covering the Resource Adequacy framework for demand assessment and forecasting, generation resource planning, power procurement planning, and monitoring and compliance along with demand management schemes for automatic load management like rotational load shedding, demand response (which may include lower Tariff for interruptible loads) etc., to curtail / prevent over drawal from the grid at times of low frequency etc.

3. The CEA/CERC/FoR has notified New/Model Regulations/Guidelines and amendments to the existing Regulations cited as under:
   a) Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006.
   b) Central Electricity Authority (Technical Standards for Connectivity in the Grid) Regulations, 2007.
   c) Central Electricity Authority (Grid Standards) Regulations, 2010.
   d) Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013.

e) FoR Model Regulations on Power Quality for State, 2018.
f) Central Electricity Authority (Technical Standards for Communication System in Power System Operation) Regulations, 2020.
g) Central Electricity Authority (Cyber Security in Power Sector) Guidelines, 2021.
h) Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022.
i) Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2023.
j) Central Electricity Authority (Electricity Distribution Network Planning Criteria) 2023.
k) Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023.
l) CEA (Guidelines and Best practices for Operation and Maintenance of Distribution Transformers) March 2023.

In view of the foregoing, the following Codes and Standards for the Distribution System are proposed to be revised in order to be consistent with the Regulations of CERC and CEA mentioned above.

1. **Distribution Planning Code:**
   a) System Construction and Security Planning
   b) Resource Adequacy Planning
   c) Quality Assurance Plan(QAP)

2. **Distribution Operation and Maintenance Code.**
3. **Safety Standards for Distribution System.**

Thus, by exercising the powers conferred under the provisions of Electricity Act, 2003 (36 of 2003), the Karnataka Electricity Regulatory Commission had notified the draft KERC (Karnataka Electricity Distribution Code) Regulations, 2024 to enforce standards with respect to quality, continuity and reliability of service by Distribution licensees for inviting comments from stakeholders.

The Commission also held Public Hearing in the matter on 08.04.2025. After considering the views/comments/suggestions of the Stakeholders in the matter, the Karnataka Electricity Regulatory Commission hereby specifies the following Code:

NOTIFICATION

In exercise of the powers conferred under clause (zp) of sub-section (2) of Section 181 read with sub-section (1) of Section 42 of the Electricity Act, 2003 (36 of 2003), and all other powers enabling it in this behalf, the Karnataka Electricity Regulatory Commission hereby specifies the Distribution Code as under:

1. **Short title, extent, and commencement:**

   a) These Regulations may be called the **KERC (Karnataka Electricity Distribution Code) Regulations, 2025.**

   b) These Regulations shall come into force from the date of publication in the official Gazette of Karnataka.

   c) These Regulations shall extend to the whole of the State of Karnataka.

Chapter-1: Definitions

In this Distribution Code, the following words and expressions shall, unless the context or otherwise requires**:**

Sl. No.	Particulars	Definition
1	**Act**	The Electricity Act, 2003 as amended from time to time;
2	**Agreement**	An Agreement entered into between the User and the Licensee for supply of electricity;
3	**Apparatus**	Electrical apparatus and includes all machines, fittings, accessories, and appliances in which electrical conductors are used;
4	**Area of Supply**	The area within which a Distribution Licensee is authorized by his Licence to supply electricity;
5	**Bare Conductor**	A Conductor not covered with insulation;
6	**Breakdown**	An occurrence relating to equipment of the supply system or line, which prevents normal functioning;
7	**Captive Power Plant**	a Power Plant set up by any person to generate electricity primarily for his own use and includes a power plant set up by any Co-operative Society or Association of persons for generating electricity primarily for use of members of such Co-operative Society or Association;
8	**CBIP**	The Central Board of Irrigation and Power;
9	**Circuit**	An arrangement of conductor(s) for the purpose of carrying electrical energy and forming a system or branched system;
10	**Coincidence Factor**	The ratio of coincident peak of a group of connected loads to the sum of peaks of the individual connected loads;
11	**Conductor**	Any wire, cable, bar, tube, used for conducting electricity ;

12	**Connected Load**	The sum of the ratings in kilowatt or kilovolt-ampere of the apparatus connected to the installation of the consumer which may be connected simultaneously to the source. This shall be expressed in KW or KVA. If the ratings are in KVA, the same may be converted to KW by multiplying the KVA with a Power Factor of 0.85 in case of LT and 0.9 in case of HT and EHT supply. If the same or any other Apparatus is rated by the manufacturer in HP, the HP rating shall be converted into KW by multiplying it by 0.746;
13	**Connection point /Interconnection**	A point on the electricity system, including a sub-station or switchyard, where the interconnection is established between the customer and the electricity system of the distribution licensee and where electricity injected into or drawn from the electricity system can be measured unambiguously for the customer;
14	**Consumer**	Any person who is supplied with electricity for his own use by a Licensee or the Government or by any other person engaged in the business of supplying electricity to public under the Electricity Act, 2003, or any other law for the time being in force and includes any person whose premises are for the time being connected for the purpose of receiving electricity with the works of a Licensee, the Government or such other person, as the case may be;
15	**Contract Demand**	Demand in kilowatt (kW)/kilovolt ampere (kVA)/Horse Power (HP) as mutually agreed between Distribution Licensee and the Consumer and as entered into in the agreement for which Distribution Licensee makes specific commitment to supply from time to time in accordance with the governing terms and conditions contained therein or equal to the sanctioned load, where the contract demand has not been provided through /in the agreement;
16	**DCRP**	Distribution Code Review Panel;
17	**Designated Customers**	The customers identified as major power quality polluters due to their installed non-linear loads or generation or otherwise under these Regulations and shall inter-alia include commercial buildings (Healthcare, Hotels, Airports, Malls etc.), IT/ITES and Banking, Finance & Service Industries (BFSI), Automobiles, Iron & Steel, Aluminum, Textile, Paper & Pulp, Chlor-Alkali, Petro-Chemical, Cement, Pharmaceuticals, Fertilizer, Food Processing, Plastic & Rubber and Railways/Metros, grid connected distributed generating resource and Electric Vehicle Charging infrastructure etc.;
18	**Distribution Licensee**	Licensee authorized to operate and maintain a distribution system for supplying electricity to the Consumers in his Area of Supply;
19	**Distribution System**	The system of wires and associated facilities between the delivery points on the transmission lines or the generating station connection and the point of connection to the installations of the consumers;
20	**Diversity Factor**	The ratio of the sum of peaks of group of connected loads to the combined peak load of the group;
21	**DCC**	The Distribution Control Centre as established by the Distribution Licensee to carry out the functions specified in the Grid Code and the Distribution Code;

22	**Generating company**	Any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person, which owns or operates or maintains a generating station;
23	**GRID CODE**	The Grid Code specified by the State Commission under sub-Section 1(h) of Section 86 of the Act;
24	**Harmonic**	The sinusoidal component of a periodic wave, either Voltage or Current waveform, having a frequency that is an integral multiple of the fundamental frequency of 50 Hz;
25	**High Tension Supply (HT)**	The nominal Voltage greater than 650 V and up to and inclusive of 33 KV
26	**Indian Standards**	Those Standards and specifications approved by the Bureau of Indian Standards; Indian Standard and in the absence of Indian Standard, International Electro Technical Commission Standard, Institute of Electrical and Electronic Engineers Standard, European Norms Standard in the sequence of their appearance unless stated otherwise;
27	**Load Factor**	The ratio of average load to peak load over a designated period;
28	**Low Tension (LT) Supply**	Voltages of 650 volts and below;
29	**Operational Metering**	The monitoring of energy and power supplied to Distribution Licensee from a Transmission substation;
30	**Power Factor**	The ratio of Watts to Volt amperes or the cosine of the electrical angle between voltage and current complexors in an AC circuit (The ratio of Active Power (kW) to Apparent Power (KVA));
31	**Point of Common Coupling (PCC)**	The point of metering, or any other point on supply system of distribution licensee, electrically nearest to the particular load at which other loads are, or could be, connected. For service to industrial users (i.e., manufacturing plants) via a dedicated service transformer, the PCC is usually at the HV side of the transformer. For commercial users (office parks, shopping malls, etc.) supplied through a common service transformer, the PCC is commonly at the LV side of the service transformer.
32	**Power Quality Meter**	A device suitable for monitoring and recording of power quality. It shall be capable of accurate measurement, monitoring and recording of harmonics, sags, swells, flickers and other power quality parameters;
33	**Prosumer**	A person who consumes electricity from the grid and can also inject electricity into the grid, using the same network.
34	**SLDC**	The State Load Dispatch Centre established under sub-Section of Section 31 of the Electricity Act, 2003;
35	**STU**	State Transmission Utility specified by the State Government under sub-Section (1) of Section 39 of the Act;
36	**Total Harmonic Distortion (%THD)**	Means the "Harmonic content" collectively present in a system and expressed as a percentage of the fundamental;
37	**Transmission Licensee**	A Licensee authorized to establish and operate transmission system;

38	**Transmission System**	The System consisting of extra high voltage lines/UG Cables and stations, having design/nominal voltage of 66 KV and above owned or operated by a Transmission Licensee for transmission of electrical power from the generating station / sub-Station bus bars up to the inter-connection point with the distribution system. This shall not include any part of the distribution system;
39	**User**	Any person having electrical interface with, or using the distribution system of the Distribution Licensee to whom this Code is applicable. Any other Distribution Licensee, institutions covered under Section 13 of the EA 2003 and generating units connected to the distribution system are also included in this term;
40	**Voltage Unbalance**	The deviation between the highest and the lowest line voltage divided by the average line voltage of the three phases;

The words or expressions occurring in this Code but not defined above shall have the same meaning as in the "GRID CODE", or the Electricity Act, 2003, or in the Rules and Regulations framed under the said Act. In the absence thereof, the meaning commonly understood in the electricity industry shall be applicable.

Chapter-2: Introduction / Objectives

2.1 General:

The "**Distribution Code**" is set to cover:

a. **Distribution Planning Code**: covers all the technical and design criteria and procedures to be followed by the Licensee, users connected and also seeking connection, including those covered under Section 23 read along with Section 53 of the Electricity Act, 2003, in the planning and development of the distribution system in their area of supply to ensure development and maintenance of an Efficient, Coordinated, Economical and reliable Distribution. Network considering safety and protection parameters. This is classified into:

   a) System Construction and Security Planning;
   b) Resource Adequacy Planning;
   c) Quality Assurance Plan(QAP);

b. **Distribution Operation and Maintenance Code:** contains the conditions under which the Distribution Licensee, institutions covered under section 13 read along with Section 23 (Directions to Licensees) of the EA, 2003 and Users shall operate their system by ensuring security and safe operation of the system under normal, alert, emergency, extreme emergency and restorative state and to maintain the quality, continuity and reliability of the services.

c. **Safety Standards for Distribution System**: Distribution licensees are responsible for maintaining the safety of the distribution system, including preventing danger to people and animals and damage to property. They must comply with the CEA regulations for construction and maintenance of distribution systems.

2.2 Applicability:

a. The provisions of the Distribution Code shall be applicable to all the Distribution Licensees including deemed licensees, open access consumers connected to distribution system along with entities covered under proviso 8 of Section 14 of the Act.
b. To all the specific Users of the Licensee's Distribution System (including Transmission Licensee) and those institutions covered under Section 13 of the Electricity Act, 2003.
c. Further, the Distribution Licensees and the Users connected to / seeking connection with the distribution system shall comply with the Conditions of Supply of Electricity of the Distribution Licensees in the State of Karnataka and other applicable Regulations relating to supply of electricity along with standards and Regulations under relevant laws in force.

2.3 Implementation:

a. The distribution licensee shall be responsible for the implementation of the Distribution code.
b. Nothing contained in this Code should be interpreted as imposing obligations/duties on Consumers/ Distribution Licensees greater or more onerous than those mentioned in the Electricity Act, 2003 under relevant clauses.
c. The Distribution Code contains procedures for the management of day-to-day technical situations in the Distribution System, considering a wide range of maintenance and operational conditions likely to be encountered under both normal and abnormal conditions. The Distribution Code cannot foresee all the possible operating conditions. Users must therefore understand and accept that the Distribution Licensee, in such unforeseen circumstances, may be required to act decisively and with due expedition to discharge his obligations

under the Licence. Users shall provide such reasonable co-operation and assistance as the Distribution Licensee may require in such circumstances.

The concerned Distribution Licensee shall however refer all such cases for ratification in the "Distribution Code Review Panel.

d. **Confidentiality:**

The Distribution Licensee shall not, other than as required by Distribution Code, disclose any such information to any other person without the prior written consent of such informant unless required by Central/State government departments or any authority.

2.4 Implementation and Review of the Distribution Code:

a. Introduction:

i) A standing body called "Distribution Code Review Panel (DCRP)" shall be constituted by the Bangalore Electricity Supply Company Limited (BESCOM) comprising of a Chairperson and Members.

ii) BESCOM shall publish the names of the Members of Review Panel and also inform each Distribution Licensee.

iii) The functioning of the panel shall be coordinated by the Secretary of the Review Panel.

iv) No change in this Distribution Code, however small or big, shall be made by the Distribution Licensees without being deliberated upon and agreed to by the Distribution Code Review Panel and thereafter approved by the KERC.

(However, in an unusual situation where normal day to day operation is not possible without revision of some clauses of Distribution Code, a provisional revision may be implemented before approval of KERC is received, but only after discussion at a special Review Panel Meeting convened on emergency basis. KERC should promptly be intimated about the provisional revision. KERC may issue directions required to revise the Distribution Code accordingly as may be specified in those directions and the Distribution Licensee shall promptly comply with any such directions).

b. Members of the Distribution Code Review Panel:

i) The Chairperson and the Members except the Member Secretary shall be part time members of the panel. The review panel shall generally consist of the following members having knowledge and practical experience in technical matters related to electricity supply by utilities.

ii) The Chairperson and the Secretary of the Distribution Code Review Panel shall be on rotation basis from among the members of the Distribution Licensees, but at no point of time the Chairperson and the Secretary shall belong to the same Distribution Licensee. The Secretary shall be a full-time Member of the Review Panel.

iii) The Members of the Review Panel shall be as follows:

1) One senior technical officer from each Distribution Licensee.
2) One Member from State Transmission Utility (STU).
3) One Member from SLDC.
4) One Member each from among Captive Power Plants, Co-Generation units, conventional and non-conventional generating units representing all such Users in Karnataka State. On completion of tenure, the Member shall be replaced by another person belonging to a different Distribution Licensee's territory.
5) One representative from Small Scale Industries / FKCCI / Consumer Care Society.
6) Two independent experts in the field of Electrical Engineering in which one may be from a reputed academic Institution.

iv) The members of the Review Panel shall normally have tenure of two years unless he/she ceases for any reason to be member of the Review Panel. Chairperson of the Review Panel may consider the replacement of such members.

c. Functions of the DCRP:

The functions of the Review Panel shall be:

i) To frame its own rules and procedures for conducting its business including forming a standing secretariat and appropriate funding arrangements for the panel.

ii) Maintenance of the Distribution Code and its working under continuous scrutiny and review.

iii) Consideration of all requests for review made by any User and publication of their recommendations for changes in the Distribution Code together with reasons for such changes.

iv) Provide guidance on interpretation and implementation of the Distribution code.

v) Examination of the problems raised by any User as well as resolution of the problems.

vi) Ensuring that the changes/modifications proposed in the Distribution Code are consistent and compatible with Standard Technical Manual or Guidelines, Codes, Laws, Acts, Rules and Regulations in force at that point of time.

vii) Constitution of a sub-Committee for detailed study of various matters pertaining to the Distribution Code and circulation of the findings and recommendations to Review Panel Members and the entities concerned.

viii) Holding of meetings as required but at least one meeting shall be held in six months.

ix) Subsequent to any such review as above, the Secretary of the Panel shall submit the following to the KERC:

a) A report on the outcome of any such Review Meeting;

b) Any proposed revision or revisions, the Panel may reasonably think it fit for achieving the objectives of the Distribution Code;

c) All written representations or objections from any Member of the Panel whose views were not acceptable to the Panel;

2.5 Management of Distribution Code:

The section defines the method of managing Distribution Code, pursuing of any changes/ modifications required and the responsibilities of the Distribution Licensees and the Users/ Consumers in this regard. This Section facilitates revisions considering the views of all parties in an equitable manner.

2.6 Unforeseen Circumstances:

In the event, any circumstance not envisaged in the provisions of the Distribution Code arises, the Distribution Licensee shall, to the extent reasonably practicable, consult promptly in good faith with all the affected Users in an effort to reach an agreement as to the further course of action. If such an agreement cannot be reached within the available time, the Distribution Licensee shall follow a prudent utility practice, keeping in view the nature of the unforeseen circumstance and the technical parameters of the affected User's system. Under such an event, the affected Users shall comply with the instructions given by the Distribution Licensee. The concerned Distribution Licensee shall however refer all such cases for consideration in the next meeting of the Panel.

2.7 Non-Compliance:

The Conditions of Licence require the Distribution Licensee to comply with the provisions of the Distribution Code. The Users are required to comply with the provisions of the Distribution Code, which are applicable to them. Any User or Distribution Licensee to whom the provisions of the Distribution Code apply and for any reason unable to comply with the same, shall promptly refer the matter to the KERC, justifying his actions. The KERC may grant exemption depending upon the merits of such matter. Non-compliance with the provisions of the Distribution Code without justifiable reasons shall constitute breach of Conditions of Licence.

Chapter-3: Distribution Planning Code

3.1 Distribution Planning Code Objectives:

The objectives are as under:

i) Providing 24x7 reliable, quality & economical power to all consumers.
ii) Making the power system more agile, resilient & smart with environmental sustainability.
iii) Optimum utilization of existing assets with minimum Technical & Commercial Losses.
iv) Minimum addition of new network elements to meet the performance standards set by the respective Regulatory Commissions.

v) Phase the system expansion to match the growing power demands in the time horizon.

vi) Adequate communication system and IT infrastructure like SCADA, DMS, OMS, AMI, etc., for enhancing the reliability & quality of the power supply and better consumer satisfaction.

vii) To facilitate the use of the Distribution System by any User connected to or seeking connection with it.

viii) To specify the technical conditions to be followed by the respective Distribution Licensees and Users in meeting the standards for an efficient operation of the common electrical interface.

ix) To specify the procedure for the exchange of the system planning data between the Distribution Licensee and the Users.

x) To provide the required information to the Users for connection, planning, and development of their own systems and make them compatible with the Distribution System.

xi) To enable the Distribution Licensee to co-operate with the STU in furnishing the required data as detailed in the Central / State Grid Code as the case may be.

3.2 System Construction and Security Planning:

The development of the distribution system must be planned sufficiently in advance allowing adequate time to obtain the required statutory clearances and consents or way leaves, and for carrying out the detailed engineering, design and construction to be carried out and completed within time schedule. The suitable management techniques shall be implemented allowing for sufficient time for critical activities and to co-ordinate all the activities in an efficient manner. These shall be taken care of at the time of planning itself.

The planning methodology shall include the analysis of existing system and planning of optimal & efficient future requirement of Sub-transmission and Distribution system to meet the expected demand in the operational areas.

The main objectives of System Construction and Security Planning is to design and develop an efficient and economical distribution network to provide safe, reliable and quality power supply to all consumers without any overloading or inefficient operation.

3.3 Planning Procedure:

The distribution system shall be planned and developed in such a way that the system should be capable of meeting the requirement of all categories of Consumers including open access consumers with a safe, reliable, economical and quality supply of electricity. The distribution system shall conform to the statutory requirements of:

i) The Electricity Act, 2003,
ii) The Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007,
iii) The Central Electricity Authority (Grid Standards) Regulations, 2010,
iv) The Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2023 and amendments issued from time to time.
v) The Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations, 2011.
vi) Guidelines for Model Quality Assurance plan (MQAP) for major equipment of Power Sector as per CEA Regulations 2022 notified on 23rd December 2022.

3.4 Planning Standards:

a) To enable the planning, design and construction of the distribution system for a safe and economical operation with the specified degree of reliability conforming to the following standards:
    i) Distribution System Planning and Security Standard, as per the CEA (Technical Standards for Construction of Electrical Plants and Lines) Regulations, 2022.
    ii) Distribution System Construction, Operation and Maintenance Standard, Safety Standard for the Distribution System as per the CEA (Measures Relating to Safety and Electric Supply) Regulations, 2023 and amendments issued from time to time.
    iii) To enable the Distribution Licensee to co-operate with the STU / Transmission Licensee in furnishing the required data as detailed in these Regulations.
    iv) The CEA Grid Connectivity Regulations.
    v) Relevant Indian Standard Specifications.

vi) Statutory Acts and Rules, which are in force,

vii) REC (Rural Electrification Corporation) Construction Standards and Manuals.

viii) Recommended Practice for Harmonics Control in Power Systems.

ix) CEA (Guidelines and Best practices for Operation and Maintenance of Distribution Transformers) March 2023.

b) The Distribution Licensee shall plan the distribution system expansion and reinforcement keeping the following in view along with all other measures to accommodate and adoption of new and evolving technology:

i) To provide reliable and quality power supply by maintaining voltage regulation within permissible limits at all consumer installations, this facilitates bringing down the energy losses within permissible limits.

ii) Maintaining optimal ratio of HT and LT line lengths to facilitate bringing down the distribution losses to less than 10%.

iii) Use of Aerial Bunched/Covered Conductors.

iv) Underground Cables.

v) Optimizing the number of distribution transformers and their location at the electrical load centers.

vi) Balancing of the loads on each of the phases of supply in LT lines.

vii) Power factor correction.

c) Demand Assessment and Forecasting shall be carried out as per the KERC (Framework for Resource Adequacy) Regulations, 2024. To ensure accurate load forecasting not only for power procurement, but also for the strengthening & expansion of the network in the most economical way. It should be as accurate as possible keeping in view the quantum of future load growth and the impact of EV/Solar Roof tops/BESS/DSM etc., on the demand.

d) Geographical Information System (GIS)- Consumer Indexing & Asset Mapping:

GIS is the system which leverages the actual information of lay out of power system on the geographical map digitally. GIS helps in addressing the challenges of utilities whose assets and network are spread across the geography for providing services to their consumers. The use of GIS can help various other processes which include SCADA, Distribution Management System, Outage Management System, Network Planning, Energy Auditing, Field Force Automation, Asset Management, Customer Relationship Management, and other associated processes. This is the optimal platform and foundation technology for utilities which contains the complete information as mentioned below:

1. Geo coordinates controlled Asset record management:

   The digital maps of distribution network shall be developed for each of the following preferably by conducting GPS survey which is easier, fast, accurate and economical:

   i) 33 kV network of complete distribution system indicating distance, type and size of conductor /size of Underground (UG) cable with single core or 3-core for lines and Sub-Station particulars with Single Line Diagram (SLD).
   ii) The feeder-wise 11 kV lines/cables indicating the distance, type and size of conductor /UG cable, location and capacity of Distribution Transformer Centers (DTCs).
   iii) The DTC-wise LT line /cables with number of Consumers and connected load on each of LT support / LT feeder pillar Box.

2. Network topology for operation service management.
3. Consumers' location and indexing with DTC-wise network and asset for service delivery:

   The last mile of a distribution network is the pole or support in overhead system or the service pillar / feeder pillar box in underground cable distribution system. Hence, the consumer indexing has to be done with

respect to the last mile of the distribution network. The integration of consumer indexing/information with distribution network system is key to providing good consumer services and enables the utility to know how each consumer is fed normally and also on real time basis.

4. Field Crew movement and tracking for ease of services to the customers.
5. Geo-fencing of the consumers for both commercial and maintenance operations, alongside vigilance activities:

   The integration of consumer index with the distribution network will help to operate the distribution network better in the manner to simulate the network to estimate the voltage profile across the network and identify low voltage pockets without actually visiting consumer installation and measuring voltages. This will also facilitate conducting energy audit by estimating correctly the energy sales on the 11 kV Feeder / DTC and account for energy supplied to the 11 kV Feeder / DTC.
6. Commercial operations and O&M staff tagged to the assets and consumers with each geo-location.
7. The load flow studies shall be conducted using Distribution Analysis Software (DAS) by properly modeling the distribution system to identify the optimal selection of conductors, capacity, and location of Capacitors for reactive compensation and DTCs with appropriate capacities to provide quality power supply at voltages within permissible voltage regulations and to have the technical energy losses within permissible limits.

e) The following parameters of equipment and system designs shall be standardized to facilitate easy replacement and reduction of inventories of spares in stores:

i) Capacities of 33/11kV and 11/0.4 kV Transformers,
ii) 33 kV sub-Station Layouts and 11kV DTCs,
iii) Pole mounted sub-Stations,
iv) Sizes of Bus bars,
v) Capacities and ratings of Circuit Breakers and Instrument Transformers,
vi) Earthing,
vii) Lightning Arresters,
viii) Control Panels with HT and LT Protections,
ix) Station Batteries,
x) Fire Extinguishers

3.5 Energy Audit:

The Distribution Licensee shall create responsibility centers for energy audit. Distribution sub-Division and Division in charge of Operation and Maintenance shall be made as responsibility centers and accountable for the energy input and sales in their respective areas. They shall also compute month / year-wise distribution losses and prepare energy balance sheets of their respective areas. Appropriate meters shall be fixed to incoming / outgoing feeders in the area identified for each such responsibility center with a capability of storing half hourly load survey and Tariff metering data for 35 days by creating ring fencing.

The Division shall carry out energy audit of its total system duly compiling the data and analysis carried out in each sub-division. The energy received at each sub-Station shall be measured at the 11 kV terminals of all the outgoing feeders installed with appropriate energy meters such that the energy supplied to each feeder is accurately measured. It shall be compared with the corresponding figures of monthly energy sales and feeder-wise distribution loss shall be computed. The total losses thus computed shall be segregated for technical losses and commercial losses to facilitate initiation of the remedial measures for reduction of both technical and commercial losses separately. In case the Distribution Licensee has adopted ring main system at 11kV and there is difficulty in determining the distribution losses for each feeder, then the Distribution Licensee shall conduct energy audit for such Area of Supply.

DTC-wise energy audit: the AMR meters shall be provided at secondary side of all DTCs except IP sets and the monthly meter readings of all installations catered by the DTC shall be taken on the same day along with the meter reading of DTC. The month-wise DTC-wise energy audit shall be conducted to facilitate reduction of commercial and technical losses. Priority shall be given to the high loss making areas by taking up necessary measures to reduce the losses in the System.

The consolidated Division-wise, 11kV feeder-wise, and DTC- wise energy audit in which the loss level is more than the target level shall be furnished to the Commission on a quarterly basis.

3.6 System Construction and safety Standards:

The scope of this standard covers the distribution system comprising of Power Lines and Sub-Stations from 33 KV down to 400 / 230 Volts in respect of the following aspects as per the Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022.

Quality of Power Supply Parameters:

The system shall conform to the common design parameters for Sub- Stations (33/11 kV), Distribution Sub-station and lines indicated in Table below:

a) The system shall conform to the common design parameters for Sub-Stations (33/11 kV), Distribution Sub-station and lines indicated in Table below:

System Parameter	33kV	11 kV	0. 415 kV
Nominal System Voltage(kV)	33	11	0.415
Highest System Voltage(kV)	36	12	0.450
Frequency	50	50	50
System Earthing	Solidly earthed system	Solidly earthed system	Solidly earthed system

b) Lightning Impulse withstand Voltage and Power frequency withstand voltage values:

All the equipment shall be designed to withstand the Basic Insulation Level (BIL) values. The Impulse/ power frequency withstand voltage of the installed equipment in the distribution system shall be adequate to withstand the lightning surges. Lightning Arresters shall be provided for all the Transformers (Power Transformers 33/11 kV and Distribution Transformers 11/0.4 KV) and 33 kV and 11 kV lines. The lightning protection system to other equipment in the Sub-Station by shield wires or lightning masts shall be provided.

System Parameter	Voltage	Lightning Impulse withstand Voltage (kVpeak)	Power frequency withstand voltage (dry) (kV rms)
Sub-Stations (33/11 kV) and Switching Stations	33 kV	170	75
	11 kV	75	28
Distribution Sub Station (DSS)	33 kV	170	70
	11kV	75	28
	0.415 kV	-	3
Lines	33 kV	170	75
	11kV	75	28
	0.415 kV	-	3

3.7 Voltage and Current Harmonics:

The total harmonic voltage distortion and individual harmonic voltage distortion at point of common coupling shall be in accordance with the CEA Regulations, as amended from time to time, which stipulates individual and total harmonic voltage distortion in accordance with IEEE 519 -2014 standards.

i) **Voltage distortion limits:**

Bus voltage V at PCC	Individual harmonic (%)	Total harmonic distortion THD (%)
V ≤ 1.0 kV	5.0	8.0
1 kV < V ≤ 69 kV	3.0	5.0
69 kV < V ≤ 161 kV	1.5	2.5
161 kV < V	**1.0**	**1.5***

High-voltage systems can have up to 2.0% THD where the cause is an HVDC terminal whose effects will have attenuated at points in the network where future users may be connected.

ii) Measuring and metering of harmonics shall be a continuous process with meters complying with provisions of IEC 61000-4-30 Class A.

iii) The data measured and metered with regard to the harmonics, shall be available with distribution licensee and it shall also be shared with the consumers periodically.

iv) The bulk consumer shall install power quality meter and share the recorded data thereof with the distribution licensee with such periodicity as may be specified by this Commission from time to time.

v) In addition to harmonics, periodic measurement of other power quality parameters such as voltage sag, swell, flicker, disruptions shall be done as per relevant International Electro-Technical Commission Standards by the distribution licensee and the reports thereof shall be shared with the consumers.

vi) The distributed generating resource shall not introduce flicker beyond the limits specified in IEC 61000.

vii) The respective User responsible for generating harmonics adversely affecting the distribution system shall be responsible for appropriate correction.

viii) The limits of injection of current harmonics at the point of common coupling by the user, method of harmonic measurement and other such matters, shall be in accordance with the IEEE 519-2014 standards, as amended, from time to time.

3.8 Voltage Regulation:

The Distribution Licensee shall take suitable measures, sufficiently in advance, to strengthen the network/ expansion to cater to the new/anticipated loads in order to maintain voltage regulation and energy losses within permissible limits.

The voltage variations at the farthest end of 33 kV and 11 kV lines should not exceed standard limits under peak loading conditions and normal system operation regime (As per relevant IS).

Voltage Levels	Voltage variation limits	
	Minimum	Maximum
33 kV &11 kV	(-) 9 %	(+) 6%
LT	(-)6 %	(+) 6%

Voltage variation limits values

The Distribution Licensee shall take necessary action, if the voltage regulation reaches (-) 8% or (+) 5% for 33 kV & 11 KV and (-) 5% or (+) 5% for LT level to bring the voltage variation within limits so as to avoid the violation of regulation limits. To achieve the desired voltage regulation, the provision for transferring of load to the nearby under loaded circuits may be taken up. The provision of automatic switched capacitors and on load tap changer on Power Transformers (as per IS) should be kept at Sub-station for voltage correction. Alternatively, augmentation of existing lines or construction of new lines may also be considered. The efforts should also be made to extend 11 kV network up to the load center to reduce LT line and improving HT/LT ratio for loss reduction and enhancing voltage profile at consumer premises.

The load bifurcation on nearby line / distribution transformer, augmentation of lines, use of High Voltage Distribution System (HVDS), use of energy efficient Distribution Transformers & use of automatic switched capacitors at 33 kV Sub-stations or at Distribution Transformers level may be adopted to enhance the voltage profile at the farthest end. The installation of Automatic Power Factor Controller(APFC) panels at LT level may also be explored as per requirement.

3.9 Design Criteria for Distribution Lines:

The Distribution Licensee shall design and construct distribution system for providing reliable power supply using overhead / underground / AB cable in radial / loop system as per the CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022 and REC specifications.

i) Depending on site conditions such as lines passing through vegetation or narrow streets, instead of conventional HT and LT lines, aerial bunched cables or UG cables shall be laid.
ii) Vertical configuration for HT/LT overhead system can also be adopted where constraints exist for obtaining the required horizontal clearances.
iii) Spans for the lines shall also be so chosen that, the stress on the conductors, poles and insulators does not exceed design limits.
iv) To prevent loose contact and consequent heating and failure of joints and jump connections, appropriate connectors, P.G. clamps, wedge type clamps for jump connections and jointing sleeves by using twisting wrenches for conductor joints shall be used.
v) All the HT and LT lines with bare/covered conductors, aerial bunched cables or UG cables, shall be constructed in accordance with the relevant REC, CEA and other relevant Standards.

The following Standards shall be adopted for planning and design purposes:

Criteria for Providing New Electrical Equipment/Augmentation/Assets in Different Scenario/Network Conditions:

Sl. No.	Equipment	Criterion
1.	Feeders	Loading/Ring Loading above 90% in rural areas and 80 % in urban areas.
		Critical due to under-size/ old and aged sections
		Load growth
		Technical losses are more than: 1.5%
		Voltage regulations are not in limit for 33kV, 11kV feeders: (-9% to +6%)
2.	Distribution Transformer	Peak loading above 80% even after load sharing within and near-by substation with LT re-networking.
3.	Power Transformer	Loading above 70% after load sharing within substation without N-1 conditions or with nearby sub-stations.

a) The design and construction of overhead lines with bare conductors shall be generally in accordance with IS 5613 Part I, Sections 1 and 2.

The choice of the size of conductor for a line shall be made based on the following criteria:

Optimal size of the conductors, type of conductor viz., Aluminum Conductor Steel Reinforced (ACSR), All Aluminum Alloy Conductors (AAAC) and number of circuits of the line shall be decided by conducting load flow studies using DAS software for various alternates and techno-economic analysis (TEA), considering the power to be transmitted, the field conditions and the factor of safety.

i) Length of Line;
ii) Line Voltage;
iii) Permissible voltage regulation;
iv) Mechanical strength;
v) In coastal areas and other areas where severe corrosion is expected due to heavy rainfall and / or salinity in the atmosphere, AAAC only shall be used.

33kV lines with covered conductor mounted on pole type structure shall be as indicated below:

Conductor	Structure Type	Design Span (in m)	String Type	RoW (in m)
Commonly used ACSR Bare conductor	Lattice type/ Steel pole	250	"I" String/Suspension	15 meter
			Tension	
		150	"I" String/Suspension	12 meter
			Tension	
	Concrete Pole/Rail Pole/H Pole/ Single Steel Pole	100	Pin Insulator	9 meter
		60	Pin Insulator	8 meter
Covered	Pole	100		6 meter

Standard conductor sizes should be adopted for 33 kV, 11 kV and LT lines to meet the expected load up to next 15 years' time period. ACSR, AAAC, HTLS conductors, covered conductor/ABC for overhead lines and XLPE cables for UG system may be adopted. Most power utilities use ACSR conductors on account of price considerations although AAAC conductors are lighter in weight and have a longer life on account of higher resistance to corrosion. The characteristics of conductors/cables being used in distribution systems

are detailed in respective chapters. As a guideline, some of suggested sizes of conductors/cables are indicated below.

Sizes of conductors/Cables	
System voltage	**Suggested Conductor Type**
33kV	ACSR Wolf, Dog, Raccoon, Rabbit or equivalent AAAC, covered conductors, 3 core XLPE cables of sizes 95, 150, 185, 240, 300, 400 sq.mm. etc.
11 kV	ACSR Dog, Raccoon, Rabbit, Weasel or equivalent AAAC. Equivalent Aerial Bunched Cables (ABC)/ covered conductors, 3-core XLPE cables of sizes 95, 120, 150, 185, 240 , 300, 400 Sq.mm. etc.
LT	ACSR , Raccoon, Rabbit, Weasel, Squirrel , Wasp, Ant or equivalent AAC/ AAAC or equivalent Aerial Bunched Cables (ABC)/covered conductor or 3 ½ core or 4-core XLPE / cables of 95, 120, 150, 185, 240, 300, 400 sq.mm. etc.

In the choice of conductor size, the parameters to be considered are thermal limit of conductors to meet the expected loads, voltage regulation and economic loading of the lines along with related spare requirement. The choice of OH line or UG cable may be made based on the actual field conditions/ requirement of regulations, finances available etc. Preferably, the distribution system should be designed to provide alternate path in the system for increasing the reliability of the system at all levels.

Overhead lines are generally preferred for their ease of operation & maintenance, easy identification of faults, less time for rectification of faults, and much less initial cost as compared to underground cable system. The ABC cable/ covered conductor or UG cables may be laid in theft prone areas.

i) The UG cables in Distribution network are more preferred in urban areas/densely populated areas including tourist & religious places, reserve forest areas due to safety reasons in spite of higher cost. UG cables should also be used in disaster prone areas. However, UG cables take more time in case of locating & repairing of any fault in the cable. Hence, it is essential that the UG cabling system should be designed such as to provide the alternate path for feeding the loads through Ring Main units (RMUs) with the additional cable from nearby circuits.
ii) To prevent accidental short circuit due to galloping of conductors in the case of overhead lines, vertical configuration of conductors for LT

distribution lines shall preferably be adopted in open areas (rural parts) encountering with high wind velocities.

iii) The maximum length of HT and LT lines shall be limited to achieve satisfactory voltage regulation to ensure quality of power supply.

iv) The design and construction of overhead lines with AB cables shall be generally in accordance with REC Specifications 32 and IS 14255.

v) The design and laying of underground cables shall be generally in accordance with IS: 1255.

vi) Lines Supports shall conform to relevant IS. The line supports can be of steel, RCC, PCC/PSC. The RCC, PCC/PSC poles are preferred over the other two considering the cost and field condition.

vii) The supports shall be poles or narrow based lattice towers with fully galvanized structure as per site requirement.

a) The poles shall be pre-cast concrete pole, pre-stressed cement concrete pole, rolled steel joist spun pole, steel tubular pole as required;
b) PCC and PSCC poles shall not be used at cut-points and as end poles;
c) In coastal areas, higher strength poles like spun poles shall be used.

viii) Erection of poles shall be carried out in accordance with the provisions of relevant IS.

ix) For locations involving long spans or higher clearances on account of crossing of power or communication lines or a railway line or Road ways specially designed poles/lattice towers or underground cable shall be used as per requirement.

x) Double pole structure shall be used as per site conditions ensuring safe operation of lines.

xi) The height of the pole above the ground level, length of pole below ground and working load shall be decided taking into consideration wind zone, terrain, topography, and the statutory clearances required.

3.10 Reliability Analysis:

1. The following reliability indices shall be computed by the Distribution Licensee in respect of his area of supply every month and the reports shall be furnished to the Commission in accordance with **Karnataka Electricity Regulatory**

Commission (Rights of Consumers Relating to Supply of Electricity, Standards of Performance (SoP) and allied matters) Regulations, 2022.

a. **System Average Interruption Duration Index (SAIDI):** means the average duration of sustained interruptions per consumer occurring during the reporting period, determined by dividing the sum of all sustained consumer interruptions durations, in minutes, by the total number of consumers;

b. **System Average Interruption Frequency Index (SAIFI)**: means the average frequency of sustained interruptions per consumer occurring during the reporting period, determined by dividing the total number of all sustained consumer interruption by the total number of consumers;

c. **CAIDI:** means the '**Customer Average Interruption Duration Index'** which is the average time taken for supply to be restored to a customer when an unplanned interruption has occurred, calculated as the sum of the duration of each customer interruption (in minutes), divided by the total number of customer interruptions (SAIDI divided by SAIFI), unless, otherwise, stated CAIDI excludes momentary interruptions.

This index is the average duration of an interruption of supply for a Consumer, who experiences the interruptions of supply annually. This index can be calculated for a group of consumers of an area catered by a Sub-Station or a specified area as follows:

i) For the Transmission Licensee's transmission line failure:

$$\text{CAIDI} = \frac{\text{Sum of the product of number of consumers affected from each feeder emanating from the Sub-Stations in the service area affected by the failure of the transmission line and the duration of interruption to each of them.}}{\text{Total number of consumers in the service area}}$$

ii) **For the Distribution Licensee's 11kV feeder failure:**

The licensee shall calculate the value as per the formula and methodology specified in Karnataka Electricity Regulatory Commission (Rights of Consumers Relating to Supply of Electricity, Standards of Performance (SoP) and allied matters) Regulations, 2022.

Reliability Index (SAIFI, SAIDI & CAIDI) for Urban/Rural Areas					
Consumer Affected/Interrupted Basis			Load Affected/Interrupted Basis		
SAIFI	SAIDI minutes	CAIDI Minutes	SAIFI	SAIDI minutes	CAIDI Minutes
ΣNi*Ci/Ct	ΣTi*Ci/Ct	SAIDI / SAIFI	ΣNi*Li/Ct	ΣTi*Li/Ct	SAIDI / SAIFI
Where					
Ct	Total Consumers (U/R) in the feeders in the Circle Area				
Li	Total connected Load (in KWs) (U/R) in the feeders in the Circle Area				
Ni	No of interruptions (>3 min/ 5 min/ 10 min)				
Ti	Duration of interruption (>3 min/ 5 min/ 10 min)				
LI	Affected Load (KW) in the feeder				
Ci	No of Consumers in the Affected feeders				
SAIFI	System Average Interruption Frequency Index				
SAIDI	System Average Interruption Duration Index				

The following factors, which affect reliability indices, shall be considered.

a) Momentary incoming supply failures due to transient faults
b) Momentary interruptions in 33 and 11 KV feeders due to transient faults
c) Breakdown of LT feeders
d) Prearranged shutdowns on lines and feeders
e) Blowing out of distribution transformer fuses
f) Individual fuse-off calls

2. The following data shall be collected and submitted to the Commission on quarterly basis:

a) Feeder wise data on the number and duration of interruptions.
b) Number and duration of interruptions caused on account of failure of power supply at the Substation due to failure of any equipment or failure of supply to the Substation itself.
c) Duration and number of interruptions due to defects / faults in the distribution transformer center including failure of transformer.
d) Duration and number of interruptions due to defects/faults in LT distribution system.
e) Total number of consumer complaints received and attended.

3.11 Standardization of Design of Distribution Transformers:

1. The Distribution transformers to be installed in the field should have standard rating as per relevant Indian Standards (IS-1180) and should follow other rules and regulations in force like Quality Control Order, Star rating criteria etc. The higher capacity Distribution Transformers (DTs) (i.e. larger than 250 kVA) may be used for concentrated loads or area with high load density and lower capacity DTs (250 kVA and less) may be used for rural areas based on the requirement. 33/0.415 kV distribution transformers of appropriate rating, may also be used based on techno-economic considerations and actual field conditions.

   In order to ensure quality procurement along with higher energy efficiency requirements, some of the important points to be considered during procurement of Distribution transformers are highlighted below (as per CEA (Guidelines and Best practices for Operation and Maintenance of Distribution Transformers) March 2023.

   a) Distribution transformers are to be procured with Standard ratings as per IS. The maximum allowable losses at rated voltage and rated frequency permitted at 75°C for Distribution transformers can be chosen by the utility as per IS 1180 (as amended).
   b) The above losses are maximum allowable and there would not be any positive tolerance.
   c) As per the Electrical Transformers (Quality Control) Order, 2015 issued by Ministry of Heavy Industries and Public Enterprises, no person shall by himself or through any person on his behalf manufacture or store for sale, sell or distribute any electrical Transformers specified in the Schedule, which do not conform to the specified standards (i.e. IS 1180 Part-1, 2014) and do not bear Standard Mark of the Bureau of Indian Standards, on obtaining certification marks license. Accordingly, ISI marking on the Distribution transformer is mandatory and the product should be manufactured in compliance with IS 1180 Part-1: (2014).
   d) Additionally, Star rating by BEE is also mandatory on Distribution transformers.

2. Operations and Maintenance of DTs:

Regular inspections and periodic maintenance of Distribution transformers help to identify impending issues at the earlier stages and utilities may take necessary actions to prevent future problems. Distribution transformers must be regularly checked as an O&M practice especially for overloading, damaged connectors, worn-out power cords, burning smell, loose plugs or misaligned parts to minimize system failures and fire hazards. It is paramount that the maintenance crew pays attention to applicable Standards (Like ISO 9001-2015/ISO-12000) to maintain a safe working environment for both the equipment and the maintenance staff.

The proper exercise of the maintenance schedule shall be adopted by the Utility as it will lead to extension of life of Distribution Transformers, reduction in failure rate, enhanced reliability of power supply system and consumer satisfaction thereby an appreciable increase in revenue of the utilities.

3.12 Quality Assurance Plan (QAP):

1. The Utility shall be solely responsible and accountable for assuring quality in the project works. Utility shall formulate a detailed comprehensive Quality Assurance (QA) plan for the works to be carried out with an objective to create quality infrastructure works. The QAP shall be an integral part of the contract agreement with the contractor/equipment's supplier and erection agency as the case may be, in case of turnkey/partial turnkey/ or departmental execution of works. The Utility has to ensure that the quality of materials/equipment supplied at site and execution of works carried out at field is in accordance with Quality Assurance Plan /Guaranteed Technical Particulars (GTP) and Technical Specifications Approved Drawings/Data Sheets.

   The Utility through Contractor/PMA appointed by the Utility shall strictly ensure Quality Assurance checks during the day to day course of project execution and ensure the quality of material and equipment as per Quality Plan / Approved Drawings / Technical Specifications/Datasheet GTP/applicable national & international standards.

The utility should ensure that Quality Assurance Plan should be prepared keeping in view the following:

a) All equipment/materials shall comply with the relevant Indian Standards/International Standards if IS not available.
b) All type tests, Routine tests & Acceptance tests shall be as per relevant IS.
c) Pre-Dispatch Inspection (except for Power Transformers), may be excluded from the scope of quality monitoring and more emphasis should be laid upon field works quality inspections.
d) Samples of materials / equipment supplied by the contractors/manufacturers may be picked up randomly from Stores / Field from a lot for testing in NABL accredited Labs before accepting the lot.
e) Sample sizing may be based on risk profiling of material/equipment supplied by vendors/contractors. Sample Sizes may be of Two (2) types.

    i. 1st sample size may be same for all vendors and in case of failure of 1st samples,
    ii. 2nd sample size may be larger than 1st sample size for such vendors/contractors.

f) Field works quality inspections may be given more emphasis. The field quality inspection be carried out in 3 (three) stages as:
    i. On completion of 40% - 50% works,
    ii. Completion of 90%-100% works, and
    iii. Final inspection.
g) All coordination activities including reporting etc., should be through an IT based solution rather than deploying manpower for this purpose.
h) The cost of quality monitoring may be optimized including the manpower cost for coordination activities.

The Utility should prepare a separate Field Quality Plan (FQP) for civil and electrical works supported with drawings which shall be approved by their competent authority and may be uploaded at web portal. The contractor should adhere to Field Quality Plan (FQP) while carrying out physical works. The Utility should also prepare a comprehensive FQP for testing & commissioning of Grid Substations, Distribution transformer Substations, 33

KV, 11 KV line, LT line etc. The system should be energized only after performing all tests as described in the FQP and after clearance from Electrical Inspector. Proper records in this regard, including tests on earth resistance, insulation resistance of 11 kV line, Distribution Transformer etc., shall be maintained, jointly signed by Utility and contractor. All the quality assurance checks conducted in the field should be documented properly and signed by the quality Engineer of the contractor & utility and shall be kept for future reference. These documents shall be maintained by the Utility in proper order and shall be made available at site for verification during inspection.

2. **Vendor Approval:**

All the materials to be procured for project works shall be purchased from the authorized vendors approved by the Quality Assurance Department of Utility. Approved vendors list should be uploaded periodically on the utility web portal. New vendors/suppliers may be approved by the utility, provided capability of manufacturer's is assessed suitably by visiting the factory premises and checking the testing facility available before accepting it as approved vendor.

3. **Type Test & Routine Tests:**

All the Type Tests & Routine Tests shall be carried out as per Indian Standards. The validity of Type Tests of major equipment /materials shall be as below:

Sl. No.	**Name of Equipment**	**Validity Period** (in years)
1	Power Transformer	5
2	Distribution Transformer	5
3	Circuit Breaker	5
4	Isolator	5
5	Lightning Arrester	5
6	Instrument Transformers (CT/PT)	5
7	LV and MV Switchgear	5
8	GIS & Hybrid Switchgear	5
9	Cables and associated joints (ABC/Underground)	5
10	Capacitor/ Capacitor Bank	5
11	Energy Meters, Electronic Meter	5
	Smart Meter	3
12	Battery and Battery Charger	5
13	Conductors (Bare/Covered)	5
14	Insulators (Porcelain/ Glass/ Composite)	5

4. **Factory/Site Acceptance Test:**

The sample of following important materials should be picked up randomly from the lot received at site and tested at third party NABL accredited laboratory before accepting the lot.

1. Distribution Transformer
2. Ring Main Unit
3. CT/PT Unit (Outdoor) & Metering Cubicle (Indoor)
4. Circuit Breaker
5. Insulators
6. Cables
7. Conductor
8. Control & Relay Panel
9. Overhead Conductor/ ABC
10. Energy Meter
11. Poles
12. Insulators
13. Capacitor
14. Distribution Box.

The Utility may add the important material in the above list. The testing of site acceptance tests shall be as per approved Drawings/Technical Specifications/Data sheet/GTP/QA Plan and applicable national & international standard.

5. **Pre-Commissioning Tests:**

On completion of erection of the equipment and before charging, each item of the equipment shall be thoroughly cleaned and then inspected jointly by the Utility and the contractor for correctness and completeness of installation and acceptability for charging, leading to initial pre-commissioning tests at Site. The list of pre-commissioning tests to be performed should be included in the Contractor's quality assurance programme.

6. **Commissioning Tests:**

The contractor will use all required instrumentation and control equipment during commissioning tests and such measuring equipment and devices should be duly calibrated as far as practicable. The tests will be conducted at the specified load points and as near the specified cycle condition as

practicable. The contractor will apply proper corrections in calculation, to take into account conditions, which do not correspond to the specified conditions any special equipment, tools and tackles required for the successful completion of the commissioning tests shall also be provided by the contractor.

The specific tests to be conducted on equipment should be included in the technical specifications. However, where the pre-commissioning tests have not been specified specifically they shall be as per relevant IS Code of Practice or as mutually agreed. The Contractor shall also be responsible for ensuring compliance of all statutory requirements for commissioning and successful operation of the system.

7. **Quality Assurance of Completed Works:**

The sample size for Inspection/verification of works completed (the indicative sample size is applicable only for fully completed works) may be as below:

i) 10% of HT feeders (in terms of sanctioned length of project i.e., Sub-Division, covering at least 10% of the total sanctioned number of feeders) for each voltage level and/configuration (OH/AB/UG/HVDS), including Bay extensions as applicable;
ii) 5% of HT feeder reconductoring /replacement /renovation work (in terms of sanctioned length of project i.e., Sub-Division, covering at least 5% of the total sanctioned number of feeders) for each voltage level and/configuration (OH/AB/UG);
iii) 5% of New Distribution Transformer Substations (11/0.415 kV) for each KVA level;
iv) 5% of Capacity augmentation of Distribution Transformer Substations (11/0.415 kV) for each KVA level;
v) 5% of LT lines (in terms of sanctioned length of project i.e., Sub-division) for each configuration (OH/AB/UG);
vi) 5% of LT Lines reconductoring/ replacement/renovation work (in terms of sanctioned length of project) for each configuration (OH/AB/UG);

vii) 5% of any other works sanctioned in the DPR with sanction value more than 5% of the sanctioned cost;

viii) SCADA/DMS/AMI System infrastructure-primarily at system field level for high level functional checks;

ix) Works completed under Smart metering component 1% or 1,000 Meters of consumer Smart meters implemented under the scheme, whichever is less, including the LT auxiliary works- 2% of DT/Feeder/ Boundary meters implemented under the scheme, including the auxiliary works.

In case any discrepancy/shortcoming in quality in the completed works is found, based on the report of the Third Party Audit during inspection, then the same should be rectified by the Contractor within the stipulated time limit.

8. **Quality Assurance Programme of the Bidder/Contractor:**

To ensure that the equipment and services under the scope of the tender whether manufactured or performed within the Contractor's Works or at his Sub-contractor's premises or at the Utility site or at any other place of work, are in accordance with the specifications/tender conditions. The Contractor shall adopt a suitable Quality Assurance Programme. Such programme shall be broadly outlined by the contractor and finalized after discussions with the utility before the award of the contract. The detailed programme shall be submitted by the contractor after the award of contract and acceptance by the Utility.

A Quality Assurance Programme of the contractor shall generally cover the following:

a) Organization structure of the Contractor for management and implementation of the proposed quality assurance program.

b) Documentation control system.

c) Qualification data for bidder's key personnel.

d) The procedure for purchases of material parts /components and selection of Contractor's services including vendor analysis.

e) System for shop manufacturing and site erection controls including process controls and fabrication and assembly control.

f) Control of non-confirming items and system for corrective actions.
g) Test procedure for field activities.
h) Control of calibration and testing of measuring instruments and field activities.
i) System for indication and appraisal of field inspection status.
j) System for quality audits.
k) System for authorizing release of manufactured product.
l) System for maintenance of records.
m) System for handling storage and delivery.
n) A manufacturing quality plan detailing out the specific quality control measures and procedures adopted for controlling the quality characteristics relevant to each item equipment furnished and/or services rendered.
o) A Field Quality Plan covering field activities.

The Utility or his duly authorized representative like PMA reserves the right to carry out quality audit and quality surveillance of the system and procedure of the Contractor/his vendor's quality management and control activities.

The Contractor would be required to submit all the Quality Assurance documents as stipulated in the Quality Plan. The contractor shall supply the materials/equipment of type & design which has already been Type Tested. Contractor/Manufacturer shall provide copy of such tests at the time of bidding and also at site in support of type-tested materials supplied under the contract.

The Utility should share their Quality Assurance Plan /Field Quality Plan with the Contractor. The schedule for submission/approval of document as per QAP/FQP shall be finalized before placement of the contract, keeping in view the overall project schedule. The Contractor shall be responsible for any time delay, misinterpretation, error and conflict during design, manufacturing, testing and erection of the works resulting from non-compliance with the requirements of the approved specification.

3.13 Standardization of Sub-Station Layouts:

The Distribution Licensee shall develop standard layouts for the Sub-Stations of 33/11 kV and 11kV/400 volts duly complying with the requirements as specified in the Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022.

3.14 11 KV / 400 V – 3 Phase Distribution Transformer Centers:

i) The Distribution transformers up to and including 250 KVA capacity other than those meant for indoor application shall normally be pole mounted.

ii) The layout of distribution transformer centers shall generally conform to the relevant REC Construction Standards.

iii) The distribution transformers shall be located close to the electrical load center of the load fed by it.

iv) The distribution transformers above 250 KVA capacity shall be plinth mounted.

v) MCCBs of suitable rating shall be provided on the secondary side of the transformers above 100 KVA. Fuse units of suitable rating shall be provided for transformers up to and including 100 KVA. HRC fuses are to be provided wherever the short circuit levels are high.

vi) Wherever the 400 / 230 V distribution lines pass through thickly populated residential areas and roads with heavy traffic, Earth Leakage Circuit Breakers of appropriate rating shall be provided to the secondary circuits of the distribution transformers.

vii) Suitable measures shall be taken sufficiently in advance, to augment the capacity of the feeders and installation of additional transformer centers in the event the specified voltage regulation limits are exceeded.

3.15 Reactive Power Compensation:

The distribution licensees shall provide adequate reactive compensation to compensate the inductive reactive power requirement in their system so that they do not depend upon the grid for reactive power support. The power factor of the distribution system and bulk consumer shall not be less than 0.95. In case of low/high power factor, adequate capacity of reactive power compensator shall be installed for pf correction.

Shunt capacitors of un-switched / switched type shall be installed at the appropriate places in the distribution system for power factor improvement, maintaining satisfactory voltage profile and reduction of sub-transmission and distribution Losses. The optimization for the size and location of the capacitor installations shall be achieved by conducting studies using Distribution Analysis Software. Suitable precautionary measures, such as automatic switching off of capacitor banks etc., shall be adopted to avoid over voltages during light load periods.

3.16 Service Mains:

The service mains to consumers shall be laid in accordance with the CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, and the CEA (Measures Relating to Safety and Electric Supply) Regulations, 2023 and amendments from time to time.

3.17 Metering Arrangement:

a) The metering for 230 V single-phase supply shall be provided on a suitable board, located in such a place protected from sun and rain and shall be in a convenient position for taking readings. The meter shall be housed in a suitable meter housing box with provision to provide additional seals. For 400 volts three phase supply, the meters and associated metering equipment including connections shall be enclosed in a suitable meter housing box. The meter housing box shall be of sufficient strength and design with locking and sealing and shall have adequate provision for heat dissipation with the required electrical clearances. The design shall permit readings to be taken without access to the meter or its connections.

b) For HT consumers, the meters, maximum demand indicators and secondary connections, shall be housed in a separate compartment and other secondary apparatus such as instrument transformers and connections required shall be housed in a separate metering compartment, which shall be locked and sealed to prevent tampering.

c) The HT metering cubicle shall be suitable for cable entry on both sides or at least on one side preferably on power supply incoming side. No fuses are permitted in the secondary circuits of the instrument transformers i.e., both CTs and PTs. The metering cubicle shall be painted with suitable epoxy paint

for installation in coastal areas having saline weather conditions and other areas experiencing heavy rainfall / pollution. The instrument transformers shall be of fixed ratio and shall not have any taps. The primary current rating of the current transformers shall match with the normal full load current and the saturation point of the core shall be higher than the maximum current that may occur due to simultaneous full load operation of all the connected equipment.

d) For EHT consumers, the secondary terminals of the instrument transformers shall be locked and sealed and the secondary wires brought out in a suitable GI conduit pipe up to the metering panel. There shall be no screwed joints in the conduit pipes and the joints, if any, shall be welded. The energy meters shall be, as close to the instrument transformers as possible and in no case shall exceed ten (10) metres in length. The metering panel shall be housed in a weather proof enclosure with a lock and sealing arrangement.

e) Provision for remote reading of meters for LT, HT and EHT installations shall be provided wherever considered necessary by the licensee.

3.18 Safety Standards for Distribution System:

The distribution system shall conform to the following Regulations as specified by the Central Electricity Authority:

i) The Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2022.

ii) The Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations, 2011.

The distribution system shall be planned and maintained so as to fulfill the following security standards except under Force Majeure conditions beyond the reasonable control of the Distribution Licensee.

a) The feeders, feeding important loads such as Hospitals, water supply, Crematoria, Airports, Railway Stations, and the like shall be planned to have a selective switching system, so that selective switching can be operated to transfer the load on to an alternate healthy feeder.

Appropriate safety precautions shall invariably be taken in this regard. In case of failure of the feeder, these switches shall be operated immediately either manually or automatically depending on the importance of the load.

b) The feeders connected to important industries/Institutions which are very sensitive to interruption of even a short duration, shall be planned to have automatic switchover to an alternate healthy feeder in case of failure of supply.

c) Loading in any current carrying component of the distribution system (e.g. conductors, joints, transformers, switchgear, cables and other apparatus) shall not exceed 75% of their respective thermal limit in case of radial feeding and 60% of their respective thermal limit in ring main feeding system.

d) The rupturing capacity of the switchgear employed in the system shall have at least 25% more capacity than the short circuit level computed even considering the anticipated future development of the system.

e) Provision shall be made to every feeder, either primary or secondary, to manually switch over to the immediately available feeder of the same voltage class available in the vicinity. Provision shall be made in the design itself for any feeder to share at least 50% of the loads of the adjacent feeder during emergencies.

f) In case of single contingency failure of any Sub-Station equipment controlling outgoing 11KV feeders, the load interrupted shall not generally exceed 20% of the total demand on the substation.

g) There shall be at least two numbers of transformers of similar rating in every 33/11kV Sub-Station.

In every Sub-Station of capacity 10 MVA and above there shall be a provision for obtaining alternate 33 KV supply to the Sub-Station in case of a failure in the incoming supply.

Chapter- 4: Distribution Operation and Maintenance Code

4.1 Scope:

a) This Code contains the procedures and practices to be followed for a safe and efficient operation of the distribution system by the Distribution Licensee and by the Users of the distribution system of their electrical plant/equipment and lines which are connected to the Distribution Licensee's distribution system. This shall also be applicable to any electrical interface with other Distribution Licensees.

b) The following aspects of operation are covered in this Section:

i. Demand Estimation
ii. Outage Planning
iii. Contingency Planning,
iv. Demand Management and Load Shedding
v. Interface with any Generating Plants
vi. Communication
vii. Monitoring and control of Voltage, Frequency and Power Factor
viii. Safety Co-ordination
ix. Major Incident and Accident reporting
x. Maintenance and Testing
xi. Tools and Spares
xii. Training
xiii. Interface with adjoining Distribution Licensees

4.2 Establishment of Distribution Control Centres (DCC):

Each Distribution Licensee shall establish DCC in his area of supply to help in focused monitoring and to enable collection of data on the quantum of power and energy flow at the interface points and to interact with SLDC. This is essential to enable the State Load Dispatch Centre to coordinate with the ALDC directly in order to streamline the procedures for efficient operation of the distribution system.

4.3 Functions of DCC:

a) To carry out the directions issued by the State Load Dispatch Centre in the matter of system operation and demand monitoring and control in his area of supply.

b) For identifying blocks of load to facilitate shedding of load in rotation as may

be necessary for achieving control of frequency for load generation balance. The 11kV feeders are to be grouped in such a way to avoid repeated interruptions to same set of consumers.

c) Monitoring and accounting the drawal of energy by the Distribution Licensee in his area of supply.

d) In order to carry out the above functions, the DCC shall have the required communication facilities with all the interface points and the State Load Dispatch Centre, Management and other Users.

4.4 Demand Estimation:

The DCC shall estimate the hourly and daily demands at each point of interconnection on a day ahead basis based on the data of previous day and the changes that are expected due to climate change and other factors and furnish the same to SLDC.

4.5 Outage Planning:

a) The Distribution Licensee shall furnish its proposed outage programs to the DCC for onward transmission to the SLDC and the Transmission Licensee on a month- ahead basis.

b) The outage program shall indicate duration and extent of load affected. It should contain identification of lines and equipment of the Distribution System proposed to be taken out of service, date of start of outage, duration of outage, quantum of load affected.

c) The outage plan proposed by the Licensee shall be in coordination with the Transmission outage plan.

d) The above procedure shall not apply under emergency situation requiring immediate isolation of any part of the distribution system because of storm, danger to human life, danger to equipment etc., under the following circumstances:

Disconnection to be effected on any User installation due to violation of Agreement. In this case the SLDC shall be informed wherever the load to the extent of 5 MW or more is affected.

4.6 Contingency Planning:

In case of blackout of any area of the distribution system the Licensee shall restore the loads as per the instructions of SLDC.

A contingency situation may arise in the event of a total or partial blackout in the transmission system. A contingency may also arise on a part of the distribution system due to local breakdown in the distribution system itself. It may also arise due to a breakdown in the apparatus of the Transmission Licensee at the point of interconnection.

4.7 Distribution System Failure:

a) Interruptions of power supply in any part of the distribution system lasting for the period as specified in the KERC (Rights of Consumers Relating to Supply of Electricity, Standards of Performance and allied matters Regulations, 2022 and its amendments from time to time, due to breakdown in any part of the distribution system may be termed as distribution system failure.

b) The Distribution Licensee shall evolve a restoration process for such a distribution system failure.

4.8 Failure of the Apparatus of the Transmission Licensee:

a) The Distribution Licensee shall immediately contact the authorized person at the Sub-Station of the Transmission Licensee and assess the probable period of restoration and the probable restriction of load drawal from the affected Substation.

b) The Distribution Licensee shall carry out the Demand Management Plan in accordance with SLDC instructions.

4.9 Demand Management and Load Shedding:

a) DCC shall resort to temporary load shedding for maintaining the load generation balance as instructed by the SLDC. This may also be necessary due to loss of any circuit or equipment or any other operational contingency.

b) The DCC shall estimate Loads that may be shed in discrete blocks at each Interconnection Point in consultation with the Users supplied through independent circuits as required and communicate the same to the SLDC. Such Users shall cooperate with the Licensee in this regard. The DCC shall work out the sequence of load shedding operations and the detailed procedure shall be furnished to the SLDC and to the person in-charge of Sub-Stations

concerned where such load shedding has to be carried out. In case of automatic load shedding through under-frequency relays, the circuits and the amount of load to be interrupted with corresponding relay settings shall be intimated to the SLDC and persons in charge of the Sub-Stations of the Distribution Licensee as necessary.

c) If the duration of load shedding to any part of the distribution system is likely to exceed 60 minutes, the affected consumers with Contract Demand of 1 MW & above, the essential services such as Hospitals, Public Water Works and other consumers of the area shall be intimated immediately through SMS.

4.10 Interface with Small Generating Units including CGPs:

Any Generating Unit which is in synchronization with the distribution system shall abide by the provisions of this Code.

4.11 Metering and Protection:

a) **Metering: -** All Interface meters, consumer meters and energy accounting and audit meters shall conform to the provisions of the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended from time to time.

b) **Protection: -** Protection system and its co-ordination shall conform to the provisions of the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 as applicable to the distribution system and bulk consumers, as amended from time to time.

4.12 Communication:

Reliable communication links shall be established by the Licensee for exchange of data, information and operating instructions with SLDC, Transmission Licensee, Generating Companies and Users shall be in line with Central Electricity Authority (Technical Standards for Communication System in Power System Operation) Regulations, 2020 and amendments issued from time to time and CEA (Cyber Security in Power Sector) Guidelines, 2021 or any other Regulations in the matter to be framed.

4.13 Voltage and Power Factor Monitoring and Control:

a) The Distribution Licensee shall take such measures as are necessary to maintain the Voltage and Power Factor at permissible limits within his area of operation.

b) Power Factor at 33/11 kV substation should be maintained close to unity under peak loading conditions for minimum reactive drawal from Transmission grid. Minimum PF should be maintained at 0.95 PF. The adequate capacity of capacitors (fixed/ auto-switched type) should be available at the Sub-station for maintaining the PF close to unity.

The power factor of the system would preferably be not less than 0.95 at 11 kV and above level. In case of low/high power factor, adequate capacity of reactive power compensator shall be installed for pf correction.

c) Users having Loads with high harmonic content, low Power Factor and fluctuations shall install appropriate correction equipment.

4.14 Safety Co-Ordination:

a) The Distribution Licensee and the Users with the Licensee shall designate suitable persons to be responsible for safety co-ordination. These suitable persons shall be referred to as "Safety Officers".

b) The Distribution Licensee and the Users shall prepare Safety Manuals incorporating all the safety precautions to be taken for each component of the distribution system based on "the **CEA Measures Relating to Safety and Electric Supply Regulations, 2023" and the CEA (Safety Requirements for construction, operation and maintenance of Electrical plants and Electric lines) Regulations, 2011**. All the safety rules and precautions shall be observed when work is to be carried out on any Line or Apparatus, Switchgear or Circuits in any part of the distribution system or in any part of the User system. The Safety Manuals thus prepared shall be issued to all the control persons and Users for compliance.

c) The Distribution Licensee shall take all precautions and maintain the distribution system placed in a public place in such a way that it should not endanger the lives and property by following proper Construction and Maintenance Standards and as per "Measures Relating to Safety and Electric Supply Regulations, 2023" issued by the CEA from time to time.

d) The provisions of the Grid Code shall be followed at interconnection points in co- ordination with the Transmission Licensee.

e) Wherever any consumer has installed an emergency power supply system, either an electronic system with storage batteries or generators, the arrangement shall be such that the same cannot be operated without clearly isolating such system from the supply mains by using four pole isolating devise (Three Phases & neutral). The possibility of a feedback from these devices to the distribution system from any of the conductors, including the neutral conductor shall be clearly ruled out.

f) The appropriate officers in charge of that area at the electrical interface shall issue written permission to his counterpart for carrying out the work on any Apparatus, Switchgear or Lines beyond the electrical interface. Such permissions shall be termed as "Line Clear Permits" (LCP). The format of LCP shall be standardized by the Licensee and shall be used by all the concerned.

g) The Distribution Licensee shall frame checklist of operations to be carried out and the procedure for safety coordination for each electrical interface, before issue and return of LCPs. such procedure and checklists shall be issued to all the concerned by the Licensee for implementation.

4.15 Maintenance and Testing:

1. The Distribution Licensee shall prepare Construction Standards and maintenance schedules for complete distribution system components/equipment Viz., 33 kV lines, 11 kV Primary distribution, secondary L.T distribution lines ,DTCs and 33/11 kV Sub-Stations to comply with provisions as required in the **CEA "Technical Standards for Construction of Electrical Plants and Electric Lines Regulations, 2022,** and **Measures Relating to Safety and Electric Supply Regulations, 2023**" and **"Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Line Regulations, 2011** and amendments thereof"
2. In order to provide reliable power supply to all electricity consumers, the

following best practices shall be adopted:

a) Quality Action Plan, quality control including Type tests, tests on stage inspections (raw materials), routine and acceptance tests while procuring all materials and equipment.
b) Construction and quality control while execution of distribution system strengthening & system expansion works (33 kV Lines and Substations, primary and secondary distribution system including DTCs).
c) Scheduled system maintenance works and condition monitoring of equipment.

3. **Asset Maintenance:**

a) The asset records are very important for condition monitoring of assets over the years and development of refurbishment and retirement of assets. The attributable data which leads to power supply breakdowns and un-safe to lives and property shall be collected at least once in a year by walk over survey from each and every component of the distribution system.
b) The attributable data pertaining to line supports, conductors, safety clearances, insulators, earthing of non-conductive parts of the system, DTCs, U.G. Cables, RMUs, LT Feeder Pillar Boxes, Street light control boxes and service mains of consumer installations shall be collected during the survey and all the technical deficiencies shall be rectified by arranging shut downs to make the system more efficient and safe.

The DTC should be periodically checked and maintenance carried out every year including testing of quality of oil, checking of condition of fuses, and disconnection switches, as per the schedules published by Distribution licensee, if any. Maintenance of Switchgear, Protective Relays and isolators shall be carried out as recommended by the manufacturers and the relevant code of practices issued by the Bureau of Indian Standards and CBIP. These shall be carried out at the prescribed intervals and the test results shall be recorded in the maintenance registers.

4. The Distribution Licensee shall maintain well trained maintenance personnel and all the required tools in good condition, and conduct the maintenance work to ensure distribution system reliability.

5. The Users shall maintain their Apparatus and Power Lines at all times conforming to:
   a) The Central Electricity Authority (Measures Relating to Safety and Electricity Supply) Regulations, 2023.
   b) The Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations, 2011.

4.16 Tools and Spares:

1. The Distribution Licensee shall ensure availability of proper tools and tackles at all work places for carrying out the maintenance works. The tools and tackles shall be checked from time to time and their serviceability shall be ensured.
2. The Distribution Licensee shall maintain an inventory of spares required for maintenance and replacement purposes at suitable locations according to a clear policy to be laid down by the Licensee.

4.17 Training:

The Distribution Licensee shall make appropriate arrangements for training of his workmen and supervisory staff, for imparting up-to-date techniques of distribution system design, construction, operation and maintenance. Distribution Licensee shall frame a suitable syllabus for this purpose.

4.18 Distribution System Construction, Operation and Maintenance Standard:

1. General:

This standard is for the construction, operation and maintenance of the Licensee's distribution system to ensure safety, reliability and efficiency with maximum security.

2. Construction Practice:

a) The construction of the distribution lines shall be carried out strictly as per the CEA (Technical Standards for Electrical Plants and Electric

Lines) Regulations, 2022, CEA (Measures Relating to Safety and Electric Supply) Regulations, 2023 and amendments from time to time.

b) The following Standards shall also be complied with:

i) IS 7321 – Code of Practice for selection, handling and erection of concrete poles for overhead Power and Telecommunication Lines.

ii) IS 5613 - Code of Practice for design, installation and maintenance of overhead power lines - Part 1 - Lines up to and including 11 KV - Section 2 - Installation and maintenance.

iii) IS 5613 - Code of Practice for design, installation and maintenance of overhead Power and Telecommunication lines - Part 2, Lines above 11 KV and up to and including 220 KV - Section 2, Installation and Maintenance.

iv) IS 1255 - Code of Practice for installation and maintenance of Power Cables (up to and including 33 KV).

v) IS 14255 - Aerial Bunched Cables for working voltages up to and including 1100 Volts.

vi) REC Specification no 32 - Aerial Bunched Cables for working voltage up to and including 1100 Volts.

vii) IS-3043 Code of Practice for earthing.

3. As mentioned in item (iii) above, the installation practices for 33 KV lines shall be similar to that of 11 KV lines.

4. Best practices for the construction of the overhead distribution lines:

a) The line supports to be properly erected by burying at least 1/5th the height of the support. The verticality of poles shall be maintained within reasonable limits of tolerance by concreting of foundation from the bottom up to 150 mm above the planting depth as per soil conditions. These shall be suitably designed for the particular soil condition and in any case shall not be less than 450 mm x 450 mm with a mix of ratio 1:3:6 commencing from the foot of the pole and extending up to 150 mm above the planting depth. Proper back-filling to be made and consolidated to prevent leaning of the supports around the concrete in the pit dug for erection of pole.

b) Span lengths to be maintained within the designed values.

c) Guys & stud poles to be provided at appropriate places. Storm guys to be provided wherever required for lengthy lines. The Guy shall be provided at 45 to 60 degrees to the ground or should not be less than 30° between pole and guy/stay wire to make them more effective. Break insulators to be provided to the guys at a minimum height of 3.0 meters vertically above ground level.

d) The proper design tension within maximum and minimum values of each conductor to be maintained while stringing. Minimum ground clearances, vertical and horizontal clearances to the structures to be maintained as per the CEA (Measures Relating to Safety and Electric Supply) Regulations, 2023. Suitable type jointing sleeves to be provided for joining the conductors using twisting wrenches, instead of just twisting the two conductors. Similar to transmission lines, the wedge type / P.G clamps to be provided for all jump connections in the distribution lines to prevent energy loss in loose jump connections, conductor snapping, etc. In order to prevent damage to the conductors, proper binding of conductors with pin insulators using aluminium tape is to be adopted.

e) The earthed guarding to be provided at all the crossings of roads/ street for power lines and telephone lines, as per CEA (Measures Relating to Safety and Electric Supply) Regulations ,2023.

f) The main leads are to be properly taken to aerial fuse boards at the poles from overhead LT lines and the service mains to be connected to aerial fuse boards only. The overhead service mains to be taken in pipes or UG cable service mains to be taken right inside the meter board to prevent the consumer to have access to service mains before energy meter.

5. For LT lines, the conductors may be of horizontal configuration or vertical configuration depending upon the field conditions ensuring the various clearances as specified in the CEA (Measures Relating to the Safety and Electric Supply) Regulations, 2023.

6. The conductors of 11 KV and 33 KV single circuit lines shall be arranged in delta formation generally by placing the top conductor on top of the pole on an insulator with a bracket clamp and placing the bottom conductors on insulators mounted on a suitable cross arm.

7. Suitable earth guard stirrups are to be provided on each pole of 11kV line when the line runs along the street and cradle guards are to be provided when the line runs across the street. The earth guard shall be properly grounded so that, in the event of a phase conductor coming in contact with it will enable the operation of protection device and render the line harmless.
8. Correct capacity fuses shall be provided and maintained in good condition at all distribution transformer centers as per the following table.

TABLE -1

Tinned Copper Fuse Wire Sizes for Pole Mounted Transformers

Capacity of Transformer	Current Rating 11 KV side	Fuse Size SWG	Current Rating LT Side	LT side protection
25 KVA	1.31 amps	38	36 amps	MCCBs with earth leakage protection
63 KVA	3.31 amps	35	91 amps	
100 KVA	5.25 amps	33	144 amps	
250 KVA	13.13 amps	23	360 amps	MCCBs with earth leakage protection
300 KVA	15.75 amps	23	433 amps	
500 KVA	26.24 amps	20	722 amps	

9. Sufficient quantity of spares such as fuses, insulators, conductors, connectors, joint kits, PG / wedge type clamps and circuit breakers for quick replacement and restoration of supply shall be made available with all the O & M unit offices.
10. Earthing shall be carried out in accordance with IS 3043 Code of Practice for Earthing. The earth connection shall be checked periodically and maintained properly.
11. Every transformer center shall be provided with earthing for transformer neutral, Lightning Arrestor, transformer body and other metal parts as per the "IS 3043 Code of Practice for Earthing". The following table specifies the minimum size of earth wires to be used for earthing of the neutral point of the Distribution transformers:

TABLE 2

Transformer Rating	Insulated PVC single core stranded aluminium conductor
50 KVA and below	16 sq.mm.
75 KVA	25 sq.mm.
100 KVA	35 sq.mm.
150 KVA	70 sq.mm
200 KVA	95 sq.mm.
250 KVA	150 sq.mm.
300 KVA	225 sq.mm.
500 KVA	300 sq.mm.

12. The following table specifies the minimum size of earth lead to be used for equipment earthing, such as transformers, motors, generators, switchgear etc.

TABLE 3

Rating of 400 Volts, 3 phase 50 Hz equipment in KVA	**Size of PVC insulated Aluminium earthing conductor**
Up to 5	6 sq.mm.
6 to 15	16 sq.mm.
16 to 50	16 sq.mm.
51 to 75	25 sq.mm.
76 to 100	35 sq.mm.
101 to 125	50 sq.mm.
126 to 150	70 sq.mm.
151 to 200	95 sq.mm.
201 and above	185 sq.mm.

13. The voltage gradient at the earth electrode at the transformer center may attain sufficiently high value during heavy flow of ground currents and become dangerous to cattle and human life. To eliminate the possibility of danger, the top of the earth electrode shall be buried below earth surface and the connecting lead should be insulated. The top of the earth electrode shall be at least 300 mm below the surface of the soil as per clause 11.2 of IS 3043.
14. The safety clearances of the overhead lines for HT/LT lines are as follows:

TABLE 4

Sl. No.	**Particulars**	**For LT Lines (Mtr)**	**For 11KV Lines (Mtr)**	**For 33KV Lines (Mtr)**
a)	Clearance above the ground of any conductor of an overhead line, including service line **across any street**.	5.8	6.5	6.5
b)	Clearance above the ground of any conductor of an overhead line, including service line **along any street.**	5.5	5.8	5.8
c)	Clearance above the ground of any conductor of an overhead line, including service line **erected elsewhere.**	4.6	4.6	5.2
d)	Vertical clearance of overhead conductor above or adjacent to or terminates on any building, minimum clearances from any accessible point.	2.5*	3.7*	3.7*
e)	Horizontal clearance between the nearest conductor and nearest part of the building	1.2*	1.2*	2.0*

15. Earth electrodes, other than those used for earthing of the fence itself, shall not be installed in the proximity of the metal fence, to avoid the possibility of the fence becoming live and thus rendering it dangerous.
16. The street lighting posts with underground cables require a great deal of attention due to the fact that many times these cables are connected at lower levels to the insulated wires coming from street lights. A fuse box for the phase wire shall be fitted and properly maintained at these connections. The fuse box shall be provided with a hinged door, which shall be kept closed and locked from access to public and shall be periodically inspected and maintained. These fuse boxes shall be provided at a minimum height of 2.5 meters from ground level and to be perfectly earthed.
17. The live terminals of distribution transformers shall be at a height not less than 3.0 meters from ground level. Danger boards and Anti-climbing devices shall be invariably provided for all distribution transformer centers.
18. Suitable danger boards and anti-climbing devices shall be provided on the poles near the locations such as school premises, market places, in the vicinity of hamlets, villages, towns, cities etc.
19. The maximum span along any street in towns and cities shall not be more than 40 meters. In road crossings, the poles shall be installed on either side of the road and suitable guarding shall be provided. Wherever guarding cannot be provided due to practical reasons, aerial bunched cables shall be used for the road crossings.
20. The minimum clearances from any conductor of an overhead line from ground and buildings at different places shall be maintained as per the CEA (Measures Relating to Safety and Electric Supply) Regulations, 2023 and amendments from time to time as indicted in Table 4.
21. No joints shall be permitted on a bare conductors or wires passing over/adjacent to a building.
22. A tapping can be made only at the point of support. Only good quality PG or wedge type clamps shall be used to ensure good contact. Twisted joints shall be avoided.
23. Fuses along with isolators shall be provided to isolate different parts of the distribution system. Lightning arresters shall be provided for every 11 KV and 33 KV outgoing feeder at the Sub-Station and at places where the lines terminate for connections to the equipment.

24. The entire pedestal mounted equipment such as distribution transformers, switchgear, and distribution boxes installed in streets and accessible to public shall be protected by locking the doors and/or providing a suitable earthed fence with gate. "DANGER" Boards shall be prominently displayed on the fence and equipment.
25. The Distribution system elements in the public places should be placed in such a way that, they should not cause any hindrance to the public movement.
26. For the safety of telecommunication lines at locations where the overhead power line may cross over the same, the recommendations laid down in the Code of Practices of the Power and Telecommunication Co-ordination Committee shall be followed. The detailed drawing of the arrangement at crossings with telecommunication lines as furnished in REC Standards J4 and J5 shall be followed.
27. When erecting overhead power lines, the conductors of the same shall wherever possible, be arranged to cross over (not below) the existing telephone or telegraph lines. For any special cases where it would not be convenient or economical to remove the existing telephone or telegraph wires and erect them below the power wires, special guarding arrangements of suitable design shall be provided.

4.19 Operational Criteria:

The operational criteria comprise of:

1) Load monitoring
2) Load balancing
3) Voltage monitoring and control
4) Data logging
5) Load management
6) Communication
7) Safety coordination

1. Load Monitoring:

Station Log Sheets and Registers for Station operations duly recording the hourly readings of the meters such as current, load, voltage etc., shall be maintained at each Sub-Station. A separate register for the daily energy meter readings for both the energy received and energy sent out shall be maintained along with the above.

2. Load Balancing:

a) The unbalanced load on the LT side of the distribution transformers shall not exceed 10% during peak load.

b) The secondary currents and voltages of the distribution transformers shall be recorded at least once a quarter during expected peak load hours on all the phases.

i) 35 days stored Load survey & billing data from the ETV meters provided on LT side of DTCs shall be down loaded from communication port every month and following analysis shall be conducted:

a) Peak load amperes of all three phases.
b) Highest & lowest voltages during the month.
c) Unbalanced currents between the 3 phases during peak.
d) Load Power Factor
e) Monthly active and reactive energy.

ii) Neutral current and voltage between neutral & ground shall be measured during the peak load.

3. Voltage Monitoring and Control:

i) The Voltage monitoring at each Sub-Station feeding 11 KV distribution system shall be monitored and voltages are adjusted to ensure that the voltage profile is within the specified limits. The data logging of the same shall be carried out.

ii) The voltage condition shall be monitored by operating OLTC of Power Transformers in 33 /11 KV Sub-Stations to correct the voltage at the sending end whenever required.

iii) The capacitor banks at appropriate locations on the 11kV side as well as 400 Volts side shall be installed to maintain the PF at 0.95.

iv) The voltage unbalance between phases is defined as deviation between voltage of highest and lowest phases divided by the average voltage of three phases. The voltage unbalance shall not exceed 3% at 33 KV and 3.5% at 11 KV.

4. Data Logging:

a) All the important data such as Voltage, Current, Power Factor, KW, KVA and Transformer data such as tap position, oil/winding temperature, etc., shall be logged on hourly basis in all Sub-Stations.

b) The following records among others shall be maintained at each Sub-Station:

i. Station log books
ii. Operation and Maintenance Manuals for the Sub-Station
iii. Maintenance Registers for the equipment and Station batteries
iv. Interruption Register
v. Line Clearance Register
vi. Equipment Register Peak load register

A detailed analysis of the above data shall be made periodically, to assess the performance of the equipment and overloading conditions if any, for taking necessary decisions.

5. Load Management:

a) In the event of total or partial blackouts of the State or regional transmission system, the Distribution Licensee shall follow procedures as laid down in Karnataka Electricity Grid Code (KEGC) for restoring normalcy.

b) In the event of breakdown within its own system, the distribution licensee shall restore/ maintain supply within the limits specified in the Standards of Performance by taking appropriate measures.

c) Under-Frequency relays shall be employed for automatic load control to ensure Grid Security as decided in consultation with the Regional Power Committee (RPC).

6. Safety Coordination:

The Distribution Licensee and the consumers shall abide by the general safety requirements of the CEA regulations issued under Section 53 of the Electricity Act, 2003, for construction, installation, protection, operation and maintenance of electric supply lines and apparatus, and the procedures laid down in this CODE.

The Distribution Licensee shall develop Safety Manuals to meet the Safety Standards and submit such Manuals to the Commission.

4.20 Maintenance:

1) The Distribution Licensee, for the guidance of the Operation and Maintenance staff shall prepare suitable maintenance manuals and programs for the various components of the distribution system. Proper records duly updating the maintenance work done as per schedule, the details of faults, malfunctions etc., encountered in the lines and equipment during the period, the remedial action taken, etc., for each component of the distribution system shall be kept.

2) The following pre-requisites shall be first ensured for the satisfactory maintenance:
   a) The ability of the system to meet the probable over-loading due to transfer of loads from the adjacent systems during emergencies.
   b) The quality of the materials used.
   c) Trained and adequately equipped maintenance staff.
   d) Schedule of maintenance for each component of the system.

3) The maintenance work shall consist of routine inspection, cleaning, testing and adjustments, if any, required and shall be different from the work carried out after a breakdown of any equipment in service, for restoring the same to the working condition, which cannot be planned in advance.

4) The maintenance schedules drawn shall cover the following:
   a. Inspection
   b. Preventive and routine maintenance
   c. Overhauls

4.21 Inspection:

This shall include the periodical inspection in service for a check on the condition of the equipment/lines in service as a precautionary measure to prevent faults and defects that may develop during its operation so that advance action can be taken to rectify the defects in a planned manner and prevent breakdowns.

a) Preventive & Routine Maintenance:

The preventive & Routine utility maintenance strategy involves planned utility maintenance through regular inspections, equipment maintenance, and part replacement in electrical distribution equipment. The goal of this approach is to minimize breakdowns, extend equipment life, and prevent unforeseen events. The schedule shall be drawn on the basis of data

obtained from inspection and maintenance checks, giving priority to the troubles encountered during normal operation of the line or equipment. This is to be done primarily twice a year, once before monsoon and the next is done after monsoon to see if any breakdown has occurred in the line. Such maintenance of line improves its life drastically.

Few of the preventive measures and cheeks performed during maintenance are:

i. Line patrolling,
ii. Maintaining adequate ground clearance,
iii. Replacement of insulators,
iv. Restringing of lines,
v. Replacement of burnt/damaged jumpers,
vi. Replacement of damaged conductor,
vii. Replacement of damaged pole, etc.

b) Breakdown Maintenance:

When an overhead line trips on a sustained fault, it should be inspected to find out the nature of fault such as loose sag, snapping of conductor, tree branches touching the lines, conductor falling on cross arms. The improvement works with a view to avoid re-occurrence of such faults in future should be arranged and carried out soon. Complaints regarding no current/failure of power supply, voltage fluctuation shall be attended on top priority.

Problems related to current such as failure of power supply in premises could occur due to various reasons such as:

i) Fuse blown out/tripping of MCB
ii) Burnt meter
iii) Broken service line
iv) Service line snapped from pole
v) Fault in distribution mains
vi) Distribution transformer failure
vii) Fault in HT system
viii) Problem in grid substation
ix) Planned/scheduled/emergency maintenance work
x) Load shedding
xi) Street light complaint

c) Pre-monsoon Inspection:

Inspection Checklist for Overhead Power Distribution Lines Maintenance

Overhead power lines' maintenance is required to minimize interruptions and improve the efficiency of power supply. The overhead lines should be inspected periodically to detect any fault which may lead to break down of electric supply. When an overhead line trips, it should be inspected to find out the nature of fault.

i) Low Tension (LT) Line Maintenance includes:

a. Alignment of poles & Leaned poles should be rectified
b. Replacement of damaged service wire
c. Removal of bird nests
d. Tree clearance & Tree cutting should be properly executed.
e. Checking of pole fittings and street light brackets
f. Careful examination of damages to LT conductor such as black spots on conductor
g. Sagging of lines should be minimized by restringing
h. Lines should be properly aligned by tightening with proper bolts and nuts.
i. Earthing should be checked
j. Torn insulators/flash over insulators should be replaced

ii) Ground Patrolling:

The periodic patrolling (not exceeding a month) of overhead lines at ground level, while, the line is live, is called ground patrol.

iii) Pole Inspections: The following should be checked:

a. Leaning of pole
b. Sinking of Earth around the Pole
c. Corrosion of metal at ground Level
d. Cracks in Pre Stressed Cement Concrete Poles (PSCC)

iv) Cross Arms Inspections: The following should be checked while maintaining cross arms:

a. Tilting of cross arms
b. Rusting of cross arms
c. Bird nest or creeper on cross arm

v) Bindings Inspections: The looseness and cutting of bindings should be carefully observed while patrolling.

vi) Conductors Inspections: The following should be checked while maintaining conductors.

a. Cut strands, burnt marks and corrosion
b. Breakage/Looseness of conductors
c. Spotting kites, green creepers on the conductors Stay Wire Inspections: The following should be checked while maintaining stay wire;
d. Corrosion of guy rod and stay wire
e. Guy wire tightness
f. Creeper on the stay wire

vii) **Conductor Inspections:** Conductors checked for mechanical damages caused by the following:

a) **Aeolian vibration:** During high wind stream of air passes across a conductor, vortices (eddies) are formed on the leeward side (back side). These vortices create alternating pressures producing movement at right angles to the direction of the air flow thus Aeolian vibration exerts excessive pressure on overhead power lines causing fatigue, failure of conductor strands and accessories related to the support.

b) **Galloping:** The high-amplitude, low-frequency oscillation of overhead power lines is due to wind. Sway oscillation and gallop tend to short circuit between the lines and thus damage is caused due to arcing. PG clamp maintains equal distance across the lines by maintaining the sag to protect from sway oscillation.

c) **Unbalance loading**: Major line failures are due to unbalance load when one phase conductor gets overheated and snapped (melted down) due to excessive current.

d) **Overloading:** When a line is loaded beyond the maximum current carrying capacity the conductor gets overheated and snapped.

viii) Breakers Inspections: Breakers & Switchgears require regular maintenance and following checks:

a. Defect in closing of the breakers & switches
b. Missing of the lock
c. Damage of earth wire
d. Dust accumulation on the insulators
e. Blades /contacts burnings

ix) Cable Boxes & End Terminations Inspections:

a. Proper supporting of cable and cable boxes.
b. Damage to insulator and compound leakage from the box.
a. Intactness of terminal connections with overhead lines and earthing.

x) Insulator Discs Inspections:

Due to moisture and dust particles on the surface of insulator the resistance is reduced which leads to flash over and failure of insulators due to following causes:

a. Due to difference in temperatures and hot and cold season, there is extra stress on both conductor and insulators of entire overhead network.
b. During rainy season dust over the insulator becomes conductive and forms fine hair crack which further develops to fretting due to load and lightening.
c. Excessive tightening of PG clamps causes extra strain to disc insulator, pin insulator and conductor through-out up to end points and causes tensile breaks of conductor and abrasion, fatigue on pin insulators.
d. Though lightning arresters (LA) are the most effective means of protecting electrical lines against lightning and switching, failure of LA directly impacts the insulators damage due to spark.
e. Line conductors are electrically insulated from each other as well as from the pole 'insulators'. The insulator and its binding should be mechanically strong enough to withstand the resultant force due to combined effect of wind pressure and weight of the conductor in the span.

d) Measuring Equipment Testing & Inspections:

Proper calibration and working of equipment should be double checked before using them for testing and repair activity. In case tools used in testing are not properly working and calibrated, then it will not lead to proper adjustment of equipment which in turn would result in malfunction of the total connected system. All the equipment which are meant for testing and repair activities should be kept separately from other equipment, and should be tested for their accuracy and workability according to defined standards.

e) Overhauls:

This shall cover the preventive maintenance work to be done on the equipment based on the past experience and manufacturers' recommendations and involves major disassembly of the equipment. The schedule shall be drawn based on the normal life expectancy of the equipment or data obtained from inspection and maintenance checks.

The maintenance schedules shall be drawn for all the following components of the distribution system separately:

i) Power transformers and distribution transformers of 500 KVA and above.
ii) Pole mounted distribution transformers and capacitors.
iii) 33 KV and 11 KV circuit breakers along with all the associated switchgear.
iv) LT circuit breakers.
v) Pole mounted Auto-Reclosers.
vi) Power transformers and distribution transformers of 500 KVA and above.
vii) Pole mounted distribution transformers and capacitors.
viii) 33 KV and 11 KV circuit breakers along with all the associated switchgear.
ix) LT circuit breakers.
x) Pole mounted Auto-Reclosers.

Effective maintenance work shall be ensured keeping the following guidelines for the efficient working of the distribution system and for preventing accidents that may arise due to failure of any of the components.

a. The pre-monsoon inspection of the distribution lines shall be carried out.

b. The defects noticed during inspection shall be rectified at the time of inspection itself if they are of minor nature, whenever and wherever possible. In case of such of the defects, which cannot be rectified easily, the same has to be attended to at the earliest possible occasion duly chalking out a program in advance.

c. If abnormal conditions such as excessive heating or arcing or prohibitively low clearances etc., are observed, the equipment or the line shall be immediately disconnected and rectification of defects carried out.

d. Manufacturers' instructions shall always be given due consideration and implemented.

e. A continuous record of all the test results shall be maintained.

f. Appropriate inspection/maintenance checks/history sheets shall be maintained containing details of all inspection and maintenance works done.

g. All the required safety precautions/safety devices shall be used while carrying out the maintenance works.

h. The maintenance schedule shall be periodically reviewed by the Distribution Licensee in the light of previous experience and updated to include all possible improvements required for ensuring adequate maintenance, prevention of accidents and reduction in interruptions.

f) Off-Schedule inspections:

Inspections of the following nature shall be carried out to maintain the system at the required level of reliability in operation.

a. Special inspections:

These shall be made immediately after severe weather conditions, such as heavy wind storms, thunder storms and heavy rains to detect any damage or breakage of poles, insulators, conductors and/or equipment, and necessary action taken.

b. Emergency inspections:

These shall be carried out on a line during its breakdown, to locate and identify the cause of trouble in order to restore the power supply.

c. Follow up inspections:

Whenever one or more short time interruptions are noticed which may have taken place due to temporary faults, the inspection shall be carried out to locate and identify the cause of interruptions and suitable action shall be taken whenever and wherever necessary.

d. **Check inspections**:

The designated engineer in charge of the distribution system shall make these inspections periodically as a check on the conditions of the line and equipment and the efficacy of maintenance. He shall point out such defects, which might not have been noticed by the maintenance staff in the first instance.

Chapter – 5: Miscellaneous

5.1 Power to Relax:

The Commission, for reasons to be recorded in writing, may relax any of the provisions of these Regulations on its own motion or on an application made before it by an affected person to remove the hardship arising out of the operation of any of these Regulations, applicable to a class of persons.

5.2 Power to Remove Difficulty:

If any difficulty arises in giving effect to the provisions of these Regulations, the Commission may, on its own motion or on an application made before it by the distribution licensee, by order, make such provisions not inconsistent with the provisions of the Act or provisions of other Regulations specified by the Commission, as may appear to be necessary for removing the difficulty in giving effect to the objectives of these Regulations.

5.3 Repeal and Savings:

Save as otherwise provided in these Regulations, the Karnataka Electricity Regulatory Commission (Karnataka Electricity Distribution Code) Regulations, 2015 and all subsequent amendments thereof shall stand repealed from the date of commencement of these Regulations.

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5.4 Issue of Suo-Motu Orders and Practice Directions:

The Commission may from time to time issue suo-motu orders and practice directions with regard to implementation of these Regulations and matters incidental or ancillary thereto, as the case may be.

By Order of the Commission,

Secretary
Karnataka Electricity Regulatory Commission

ಮುದ್ರಕರು ಹಾಗೂ ಪ್ರಕಾಶಕರು:– ಸಂಕಲನಾಧಿಕಾರಿಗಳು, ಕರ್ನಾಟಕ ರಾಜ್ಯಪತ್ರ, ಸರ್ಕಾರಿ ಕೇಂದ್ರ ಮುದ್ರಣಾಲಯ, ಬೆಂಗಳೂರು
THAMMAIAH